

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 7,062,759 B2  
APPLICATION NO. : 09/839910  
DATED : June 13, 2006  
INVENTOR(S) : Robison

Page 1 of 5

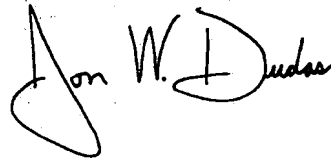
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Delete Title page illustrating a figure(s), and substitute therefor, new Title page illustrating a figure(s). (attached)

Delete drawing sheet 1,3 and 4A, and substitute therefor drawing sheet 1-,3 and 4A. (attached)

Signed and Sealed this

Fourth Day of September, 2007

A handwritten signature in black ink that reads "Jon W. Dudas". The signature is written in a cursive style with a large, stylized initial "J".

JON W. DUDAS  
*Director of the United States Patent and Trademark Office*

**(12) United States Patent**  
**Robison**

**(10) Patent No.: US 7,062,759 B2**  
**(45) Date of Patent: \*Jun. 13, 2006**

**(54) METHOD AND SYSTEM FOR INTERPROCEDURAL SIDE EFFECT ANALYSIS**

**(75) Inventor:** Arch Robison, Champaign, IL (US)

**(73) Assignee:** Intel Corporation, Santa Clara, CA (US)

**(\*) Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 717 days.

This patent is subject to a terminal disclaimer.

**(21) Appl. No.:** 09/839,910

**(22) Filed:** Apr. 19, 2001

**(65) Prior Publication Data**  
 US 2004/0015903 A1 Jan. 22, 2004

**(51) Int. Cl.**  
*G06F 9/43* (2006.01)

**(52) U.S. Cl.** ..... 717/141; 717/155; 717/151;  
 717/154; 717/157; 717/141; 717/156

**(58) Field of Classification Search** ..... 717/159,  
 717/4, 160, 133, 140-161  
 See application file for complete search history.

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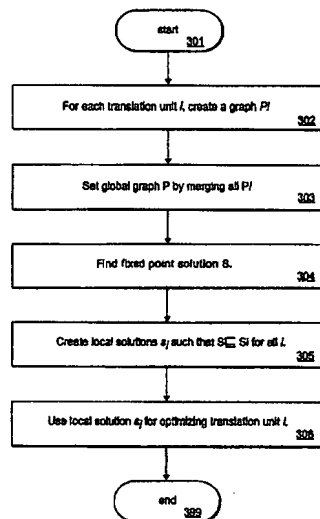
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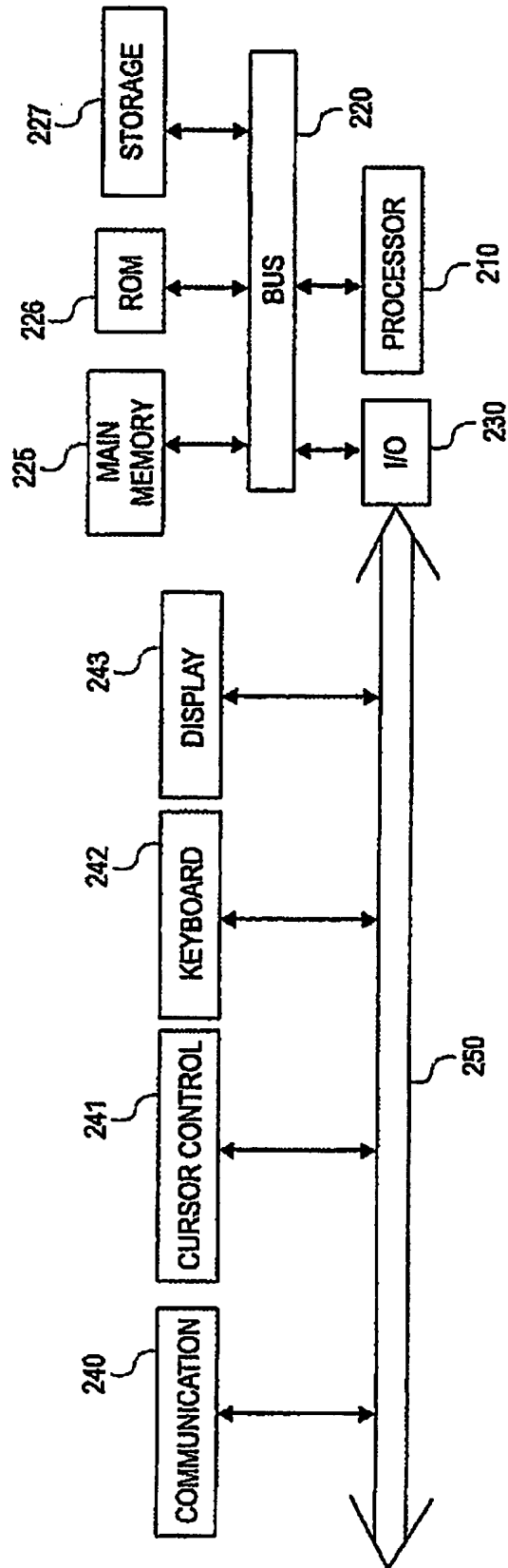
**(57) ABSTRACT**

Interprocedural side-effect analysis is performed by constructing a fixed-point problem graph for each translation unit of a software program having a plurality of separately compilable components. The method performs analyzing each routine, of a software program having a plurality of separately compilable routines, to create a plurality of local side-effect problems for each routine; and merging the local side-effect problems to create a global side-effect problem.

**18 Claims, 13 Drawing Sheets**



200



**FIG. 1**  
(PRIOR ART)

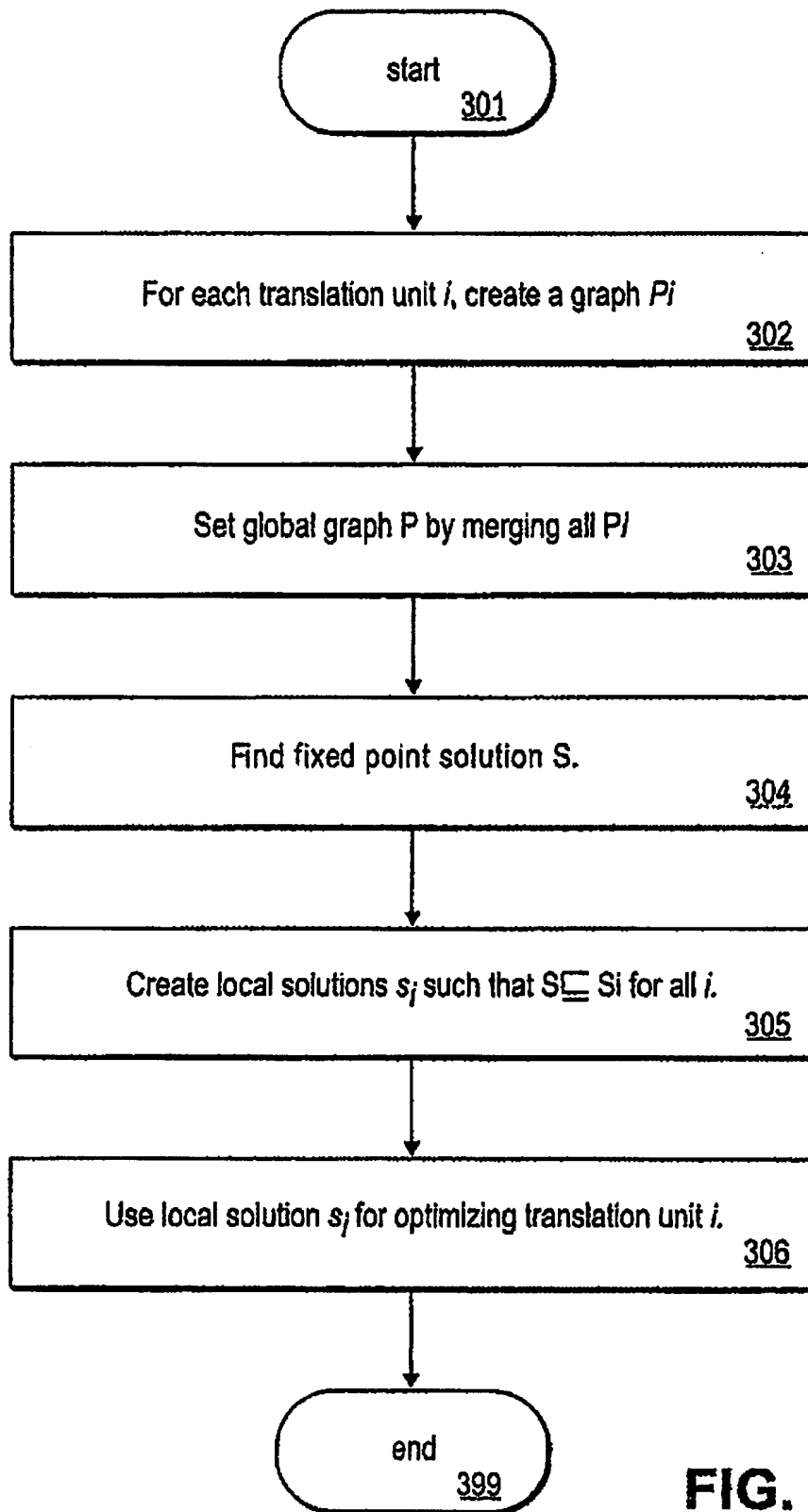


FIG. 3

Function	Function (x,y)
410 ~ TOP	(PURE,PURE)
420 ~ COPY	(y,y)
430 ~ IN_TO_LOST	if $y \leq l \Rightarrow$ (LOST,LOST) otherwise $\Rightarrow$ (PURE,PURE)
440 ~ UNRETURN	
450 COPY_AND_IN_TO_LOST	if $y = \text{LOST} \Rightarrow$ (LOST,LOST) otherwise $\Rightarrow$ (z,z) where $z = y \sqcup OI$
460 ~ CAT_FORMAL	if $y \leq l \Rightarrow$ (LOST,LOST) otherwise $\Rightarrow$ (y,y)
470 ~ CAT_ACTUAL	(y,PURE)
	(PURE,y)
480 ~ GATE	if $x = \text{LOST} \Rightarrow$ (LOST,LOST) else if $x < R$ (z,z) where $z = (x \ OI) \sqcap y$ else (z,z) where $z = (x \sqcup OI)$

FIG. 4A